

FIELD STUDIES OF THE DIURNAL RAPTORES OF EASTERN
AND CENTRAL KANSAS¹

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The economic status of the birds of prey of the United States has for some time been a subject for investigation by many ornithologists. The results of this work have shown in a striking manner the great importance of hawks and owls to American agriculture, and the immense value of these birds as destroyers of rodent pests. It is now common knowledge that the majority of rapacious birds are beneficial rather than harmful, and that only a very few species are responsible for the depredations usually attributed to the group as a whole. In order to be really just in the treatment of the birds of prey, and to derive the maximum benefit from their activities in holding in check the ravages of injurious mammals, a policy of intelligent discrimination must be adopted.

It is easier to say "discriminate", however, than actually to meet the tests which careful differentiation in the field requires. To the average person a hawk is simply a hawk, or more probably a "chicken hawk", and even though he may remember having heard that not all hawks kill chickens, he is inclined to be a little skeptical. Until this feeling of prejudice against birds of prey among farmers and sportsmen is overcome, we cannot give to the deserving species the protection that is due them. With their fate in the hands of those ignorant as to their true value, their extermination is only a question of time. It needs but a moment's thought for one to realize in some degree what a serious misfortune such a loss would mean to agricultural enterprises. It is the purpose of this paper to facilitate in some measure the problem of field discrimination of the species of day-flying birds of prey.

Dr. A. K. Fisher (1907), of the Bureau of Biological Survey, United States Department of Agriculture, has arbitrarily grouped the birds of prey of the United States into four classes according to their beneficial and harmful qualities. This classification is based entirely upon the examination of the stomach contents of thousands of specimens received from collectors throughout the country and during every season of the year. The species considered in this paper are the diurnal birds of prey (it is obvious that in a field key the owls could not be

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conveniently treated in the same manner as the hawks) which are common, or at least fairly common, in the region in which these studies were made. They fall into the scheme of Dr. Fisher's grouping as follows:²

(1) WHOLLY BENEFICIAL SPECIES:

Archibuteo lagopus sancti-johannis (Gmelin). Rough-legged Hawk.

Archibuteo ferrugineus (Lichtenstein). Ferruginous Rough-leg.

(2) SPECIES CHIEFLY BENEFICIAL:

Circus hudsonius (Linn.). Marsh Hawk.

Buteo borealis borealis (Gmelin). Red-tailed Hawk.

Buteo borealis krideri Hoopes. Krider's Hawk.

Buteo borealis calurus Cassin. Western Red-tail.

Buteo borealis harlani (Audubon). Harlan's Hawk.

Buteo lineatus lineatus (Gmelin). Red-shouldered Hawk.

Buteo swainsoni Bonap. Swainson's Hawk.

Falco sparverius sparverius Linn³. Sparrow Hawk.

(3) SPECIES PARTLY BENEFICIAL AND PARTLY HARMFUL:

Aquila chrysaetos (Linn.) Golden Eagle.

Haliaeetus leucocephalus leucocephalus (Linn.). Bald Eagle.

Falco columbarius columbarius Linn. Pigeon Hawk.

(4) SPECIES ENTIRELY HARMFUL:

Accipiter velox (Wilson). Sharp-shinned Hawk.

Accipiter cooperi (Bonaparte). Cooper's Hawk.

Astur atricapillus atricapillus (Wilson). Goshawk.

The Osprey is not mentioned by Dr. Fisher but it is included here as its identification in the field is of interest.

A glance at the foregoing will show that most of the common hawks of Kansas fall into groups 2 and 3, those mostly beneficial and those at least partly beneficial. It is also significant that the hawks of group 2, those chiefly beneficial, are of greatest abundance. Of

²The following species listed for Kansas by Goss, Snow and Lantz have been omitted because they are now rare or accidental, and not of great economic significance in this locality: *Elanoides forficatus* (Linn.), Swallow-tailed Kite; *Ictinia mississippiensis* (Wilson), Mississippi Kite; *Falco rusticolus rusticolus* Linn., Gray Gyrfalcon; *Falco mexicanus* Schlegel, Prairie Falcon; *Falco peregrinus anatum* Bonaparte, Duck Hawk; and *Falco columbarius richardsoni* Ridgway, Richardson's Pigeon Hawk.

³See page 147 for footnote concerning the Sparrow Hawk.

the entirely harmful hawks, there is no question about the desirability of greatly reducing the number of both the Sharp-shinned and the Cooper's for they, especially Cooper's, constitute the greatest menace to poultry and wild bird life. The Goshawk, fortunately, is not common in Kansas and is to be found only at irregular intervals in winter when most smaller birds have migrated southward and most poultry is well housed. It is among such native game birds as the grouse and Bob-white that the Goshawk does its serious harm.

Field students know that the different birds of prey possess various characteristics of size, form, general coloration, length and shape of wing, mannerisms of flight, prominent banner marks, call notes and other lesser indications of individuality which are of great value in identification at a distance. These characteristics differ, as a rule, with the genera. The person who knows hawks can discriminate between a Buteo and a Falcon at almost any distance as surely as if the bird were in the hand. With these in mind, the writer has endeavored to prepare a workable field key to genera and several subkeys to species, distinguishing between ages, sexes, color phases, etc., as far as possible. In preparing these keys he has endeavored to employ only those characteristics which under favorable conditions are plainly visible with the naked eye, although a prism binocular or good field glass will be found to be of great help, and its use is taken for granted in observing some of the details mentioned.

Particular attention has been given to the wing structure and wing movement in every instance. The form and shape of the wing is indicative of the habits of the bird. For example, the wing of the Falcon, long, flat, narrow, rigid, and unbroken at the end, with only the outer primaries slightly notched, is adapted to swift flight in the open. The wing of the Accipiters and the Goshawk, short, broad, deeply cupped, elastic and with the first five outer primaries emarginate, or notched, giving an "open" appearance to the rounded tip, is adapted for precipitate flight in cover.

Melanistic conditions and immature plumages greatly complicate and increase the difficulty of field identification in the cases of several species. In others the presence of many color variations of slight racial differences must be considered. In the use of these keys it must be kept in mind that all keys are subject to many limitations, and favorable conditions, good binoculars or field glasses, and at least some fundamental knowledge of the systematic arrangement of the birds of prey, are taken for granted as prerequisites to their successful use.

KEY TO GENERA

- A. SIZE VERY LARGE: Length 30 inches or over; plumage dark brown or fuscous, sometimes almost black, sometimes mottled with white; wings large and broad, blunt or rounded at tips and turning up slightly in flight.
- I. Head at distance appears the same color as body.
 1. Tarsi feathered.
 - a. Tarsal feathers white or light buff; base of tail white. . . . *Aquila*.
Immature GOLDEN EAGLE.
 - b. Tarsal feathers darker; tail with no white. . . . *Aquila*. Adult
GOLDEN EAGLE.
 2. Tarsi naked. . . . *Haliaeetus*. Immature BALD EAGLE.
 - II. Head and tail white. . . . *Haliaeetus*. Adult BALD EAGLE.
- B. SIZE MODERATELY LARGE, OR LESS: Length 15 to 25 inches.
- I. Body robust, heavy set.
 1. Plumage black; tarsi feathered; primaries and tail barred with whitish or grayish. . . . *Archibuteo*, black phase. ROUGH-LEGGED HAWK.
 2. Plumage dark brown, fuscous, or gray above.
 - a. Wings relatively broad; light or dark underneath.
 - (a) Tarsi feathered; wings rather pointed at tips. . . . *Archibuteo*.⁴ ROUGH-LEGGED HAWK, light phase.
 - (b) Tarsi not feathered; wings blunt or rounded at tips.
 - a. Tail long, only slightly rounded and seldom spread in flight. . . . *Astur*. GOSHAWK.
 - b. Tail relatively short, truncate, carried fanlike when soaring, and frequently alternately spread and closed in flight. . . . *Buteo*. Buzzard Hawks.
 - b. Wings longer, more pointed; a prominent dark streak on side of head. . . . *Pandion*. OSPREY.
 - II. Body slender.
 1. Wings short, broad, and rounded; primaries and secondaries barred with blackish. . . . *Accipiter*. COOPER'S and SHARP-SHINNED HAWKS.
 2. Wings long, narrow and pointed.
 - a. Primaries black, barred with white or whitish. . . . *Falco*. The Falcons.
 - b. Primaries tipped with black; rump white; tail long, seldom greatly spread. . . . *Circus*. MARSH HAWK.

Genus CIRCUS Laeepede.

- I. Dark brown or fuscous above; underparts buffy, streaked with fuscous or umber. . . . *C. hudsonius*. Female or immature MARSH HAWK.
- II. Silvery gray or slate color above; under-parts light gray to whitish, belly spotted or barred with rufous. . . . *C. hudsonius*. Adult male MARSH HAWK.

1. *Circus hudsonius* (Linn.). Marsh Hawk.

The Marsh Hawk is one of the most common raptorial birds of Kansas and consequently one of the most persecuted. It has been shown by Dr. Fisher and others that it feeds principally on meadow mice, rabbits, squirrels, lizards, snakes and frogs, although it is true

⁴See key to species of *Archibuteo*.

that it often pounces upon small birds and occasionally on game, and poultry. It flies throughout the day and in the evening. This hawk is remarkable for its slender, graceful form, with long black-tipped wings, narrow tail, and white rump that can be plainly seen whether the individual is an adult in silvery gray plumage, or a female or immature bird in less conspicuous garb of fuscous and buff. It is characteristic of this hawk that its quarry is eaten wherever captured.

The Marsh Hawk deserves protection except in individual cases where one is actually seen capturing poultry, game or beneficial wild birds.

Genus ACCIPITER Brisson.

- I. Length 14 to 20 inches; tail long and rounded at tip.
 1. Upperparts slate gray; underparts whitish, heavily barred with rufous; tail gray with three or four black bars and white tip. . . . *A. cooperi*. Adult COOPER'S HAWK.
 2. Upperparts fuscous; underparts whitish, streaked and spotted with fuscous; tail fuscous with darker bars and white tip. . . . *A. cooperi*. Immature COOPER'S HAWK.
- II. Length 10 to 14 inches; tail square at tip.
 1. Upperparts slate gray, streaked with blackish; underparts whitish, heavily barred with rufous; tail with black bands and a white tip. . . . *A. velox*. Adult SHARP-SHINNED HAWK.
 2. Upperparts fuscous; underparts whitish, streaked or spotted with fuscous; tail fuscous with darker bands and white tip. . . . *A. velox*. Immature SHARP-SHINNED HAWK.

2. *Accipiter velox* (Wilson). Sharp-shinned Hawk.

This little hawk with its somewhat larger relative, *A. cooperi*, is responsible for the largest share of the blame for the criminal reputation usually attached to all birds of prey. It is not a bird of the open, but frequents the wooded areas, its short wings and long tail enabling it to thread the densest thicket in pursuit of its prey which consists almost entirely of song and insectivorous birds and, when opportunity offers, of young poultry.

The sharp-shin's specific name, *velox*, (Latin meaning "swift") is highly indicative of the nature of its movements. It has been known to pounce upon a small chick and carry it away beyond gunshot before a man, on the lookout for hawk visitors, could walk ten feet to his gun. Its strength and courage would be admirable qualities were they applied in other directions.

It is small in size, measuring from 10 to 14 inches in length. Its wings are broad and rounded, primaries heavily barred with blackish gray, and tail nearly square with blackish or fuscous crossbars and a white tip. The adults are slate gray above, white barred with ochraceous buff or rufous beneath. Immature birds have the upper-

parts brown or fuscous and the underparts streaked and spotted with fuscous.

On rare occasions it is known to soar in narrow circles. It can then be easily recognized by its short, rounded wings and long, square-ended tail. It seems to prefer, however, to capture its food by making swift, fierce darts from the concealment of thick foliage, returning to cover in like manner, rather than to seek its victims by soaring high in the air as is the common method of the Buteos. Dr. Chapman (1921), states that he has seen it follow its quarry on foot through the underbrush.

The sharp-shin richly merits the punishment and persecution of the world at large, but its swiftness and secretive habits make it possible to escape most frequently the nemesis which is its rightful due.

3. *Accipter cooperi* (Bonaparte). Cooper's Hawk.

The Cooper's Hawk is very similar to the Sharp-shinned Hawk in coloring, form, and habits. It also is of a secretive nature, being found more often in the cover of trees and thickets than in the open country. It is, however, despite its larger size, less noted for sheer daring and courage. Nevertheless, it is more destructive to poultry and game birds, for it is large and strong enough to capture quite large chickens as well as desirable wild fowls. The Bob-white suffers especially from its ravages. A large percentage of its food may consist of these birds, which in winter are sometimes hunted by a pair of hawks, two or more quail being captured at one time from a single flock.

Though larger than the sharp-shin, it closely resembles that species in the coloration of both adult and immature birds. It can be distinguished from that species by the difference in size and the rounded tail. In flight across open spaces, a short sail alternates with a few rapid wing beats. This is characteristic of both members of this genus.

The Cooper's Hawk is the most abundant of the harmful hawks of this region and is perhaps the greatest menace to poultry and wild life among all the birds of prey.

Genus ASTUR Lacepede.

- I. Bluish slate color above; tail more or less distinctly barred with blackish; underparts grayish white barred and streaked with grayish black; primaries black, unbarred. . . . *A. a. atricapillus*. Adult GOSHAWK.
- II. Dark brown or fuscous above; tail barred with black; underparts white or buffy, heavily streaked with fuscous or black. . . . *A. a. atricapillus*. Immature GOSHAWK.

4. *Astur atricapillus atricapillus* (Wilson). Goshawk.

The Goshawk, were it more abundant here, would be a danger to wild life and poultry that would give rise to a problem of great

seriousness. Fortunately, it has a northern range, entering the United States only during the winter months. Even then it is not common enough in Kansas to be of great importance as a destroyer of desirable birds. In the northern states, however, it does great damage among the grouse. Its large size, great strength, and dashing courage make it possible for it to seize and carry away quite large fowls. It completely ignores the presence of man when pursuing its quarry. Authentic instances have been known where it has followed a chicken into a farmer's dwelling, in one case making its kill under the bed. On rare occasions, it has been known to attack man.

The Goshawk, like the Cooper's and Sharp-shinned Hawks, frequents the wooded regions and is admirably adapted for pursuing its quarry through dense growths of trees and thickets. It seldom or never soars, but makes swift, unerring plunges after the unlucky grouse or hare, fastens upon it at once, either in the air or on the ground, and clings to it until life is crushed out by the great and powerful talons piercing the very vitals of its prey. It also has the curious habit, sometimes practiced by the Barn Owl, of covering its victim with outspread wings and tail until its struggles cease.

The Goshawk is one of the few American hawks used in falconry since it and the true falcons alone possess the necessary strength, courage and ferocity for pursuing and striking down legitimate quarry, and the necessary tractability for their being subdued to the will of man.

Its characteristic size and form will identify the Goshawk at almost any distance. Its long tail and short rounded wings with the five outer primaries emarginate resemble the Cooper's Hawk, though the difference in size is quite apparent. Adults are bluish gray above with underparts light gray, barred or streaked with blackish, the character of the latter markings depending on age. The tail is gray, barred with blackish and rounded at the tip. Immature birds are fuscous above, with tail of the same color, and barred with dark brown or blackish. Underparts are buffy to whitish, streaked or blotched with fuscous.

Genus BUTEO Lacepede.

I. Larger than a crow: of heavy, robust body.

1. Four primaries incised at tip; in normal plumage with light band across chest; sometimes wholly dark below; tail in adult with more or less reddish brown. . . . *B. borealis* and subspecies.
⁵Red-tailed Hawks.

⁵Since *B. b. borealis* and its subspecies named above all occur in this locality and are present in so many variations of plumage, the student can never be positive in distinguishing these varieties in the field, so no attempt has been made to

2. Three primaries incised at tip; in normal plumage with dark band across chest; sometimes wholly dark below; tail in adult without evident reddish brown. . . . *B. swainsoni*. SWAINSON'S HAWK.
- II. Size that of crow or less; body less robust.
1. Size larger; length 17½ to 22 inches; outer webs of primaries distinctly spotted; wings with prominent dark crossbars; four primaries incised at tip. . . . *B. lineatus*. Adult RED-SHOULDERED HAWK.
 2. Size smaller, length 13 to 18 inches; outer webs of primaries dark, wings usually without prominent dark crossbars; three primaries incised at tip. . . . *B. platypterus*. Adult BROAD-WINGED HAWK.⁶

The large, heavy, slow-moving hawks which are found beating their way across the fields or through the timber, or sitting quietly on a dead branch of a lone tree or on a telegraph pole, are most frequently the Buteos or buzzard hawks, unless during the winter months the somewhat similar Archibuteo, the rough-leg, is seen. The hawks of this genus range from large to medium in size, from the Red-tailed to the Broad-winged. Their flight is strong but slow, with regular wing beats. When soaring, which is a common habit, they sometimes reach a great height and float through the air with tail spread like a great fan, as easily and gracefully as a Turkey Vulture. Their wings are broad, strong and rounded, and either the first three or four outer primaries are emarginate or notched giving an "open" appearance to the wing tips. In ordinary flight the tail is only slightly spread, or alternately spread and closed at brief intervals, but in soaring the tail is spread to its greatest extent and is fan-shaped.

The Buteos never pursue their quarry through the air, but seem to prefer to sit quietly on some isolated perch or soar at a considerable height and, when prey is sighted beneath, drop upon it with a swiftness almost incredible for such large and deliberate birds. The writer once witnessed a soaring red-tail suddenly pause, hover for an instant, then partially close its wings, and drop precipitously from a height of 200 feet, catching itself with extended pinions when only a few feet from the ground and pounce upon a small mammal which it carried to a perch in a large walnut tree to devour at leisure.

include these in the key. Such a key, if prepared, would present complications too great for practical field use. In general *B. b. borealis* and its subspecies are approximately of the same size and present very similar flight characteristics. It may be roughly stated, however, that *B. b. krideri* and *B. b. harlani* represent extremes in degree of coloration, light and dark respectively, and that *B. b. borealis* and *B. b. calurus* appear to be intermediate between the two, though the latter more often approaches the darker form. See further discussion under the heading *B. b. borealis*.

⁶Immature specimens of *B. l. lineatus* and *B. p. platypterus* possess scarcely enough prominent markings to distinguish them from the adults in the field although there is an obvious difference in size between the two species.

The food of the Buteos consists mainly of injurious mammals and insects, though reptiles, birds, and batrachians are also eaten. The larger members of the genus feed extensively on rabbits and though known to kill birds and poultry occasionally, Dr. Fisher has shown that from 60 to 90 per cent of their food is injurious rodents. The Red-tailed and Red-shouldered Hawks least of all deserve the appellation of "hen-hawk" which is so often given them.

From the above, and from the data given in the key to genera, the Buteos can easily be distinguished as a genus by their very prominent and apparent characters of form and flight behavior. It is possible to distinguish some of the species only under the most favorable conditions and with a good glass. Even then, with regard to the larger species, *B. b. borealis* and its subspecies, exact identification in the field is not possible except in a few cases which will be discussed under the headings that follow.

5. *Buteo borealis borealis* (Gmelin). Red-tailed Hawk.

The great similarity and lack of any distinguishing features in the immature and melanistic color phases of the Red-tailed Hawk and its races greatly complicate field work with the larger Buteos. Under favorable conditions of light and distance, *B. b. borealis* in adult plumage may be distinguished by the deep brownish-red of the upper surface of the tail. When in flight directly away from the observer, and in a favorable direction in regard to sunlight, the red of the upper side of the tail can be readily seen if the bird suddenly glides upward, thereby lowering its tail to some extent. Immature birds and melanistic specimens are easily confused with *B. b. calurus* and *B. b. harlani*, the difference in size between the common species and the latter being too slight to be important for field use. The cry of the Red-tail is sometimes significant as a mark of identification. It is a long-drawn explosive scream and once heard is not easily forgotten.

6. *Buteo borealis krideri* Hoopes. Krider's Hawk.

Very pale Buteos with a large amount of white and an absence of dark markings below can rather safely be identified as *B. b. krideri*. This is a rare subspecies in Kansas. In its habits and food preferences it is very similar to the red-tail. The stomach of a specimen, taken by the writer in 1921, contained the remains of a stripped ground squirrel, *Citellus tridecemlineatus* (Mitchill), and an entire 19 inch snake, *Coluber constrictor flaviventris* (Say) (Blue Racer). The farmer near whose home the hawk was taken declared that the bird had been stealing young chickens.

7. *Buteo borealis calurus* Cassin. Western Red-tail.

It is usually hardly possible to distinguish the Western Red-tail from other red-tails in the field in any plumage. Its adult coloration is quite similar to that of *B. b. harlani*, and the immature phases of the common species, *B. b. borealis*. It is considered by Goss to be an irregular winter sojourner, never having been seen by him during the summer months. It is doubtful if it can be considered common in this region at any time.

8. *Buteo borealis harlani* (Audubon). Harlan's Hawk.

Harlan's Hawk represents an extremely dark race of *Buteo borealis*. It is slightly smaller than the three foregoing species, rather uncommon, and practically indistinguishable in the field from immature or melanistic individuals of *B. b. borealis* or *B. b. calurus*.

9. *Buteo lineatus lineatus* (Gmelin). Red-shouldered Hawk.

Though the Red-shouldered Hawk is somewhat smaller than the Red-tailed Hawk and its subspecies, it shares with them the erroneous common name of "hen-hawk". The Red-shouldered Hawk is not abundant in Kansas as it is more commonly found in more wooded sections. It is rather solitary in habit, one pair pre-empting a certain locality for a nesting site and hunting ground and driving off other hawks that attempt to encroach. It now is a rare resident of this region in the eastern portion. This species ranks between the Red-tailed and Broad-winged Hawks in size and may usually be distinguished in the field by the heavy barring on the under side of the wings. The four outer primaries are notched. Adults have a conspicuous "shoulder patch" formed by the rufous lesser wing-coverts. They are fuscous-brown above, ochraceous buff below with underparts barred with white or whitish and with tail handsomely barred with black and white. Immature birds resemble adults dorsally, but have a less conspicuous shoulder-patch, and ventrally are white, streaked or spotted with black or blackish, tail same as back, barring indistinct.

10. *Buteo swainsoni* Bonaparte. Swainson's Hawk.

Swainson's Hawks are more western in distribution and are great insect feeders. Grasshoppers and crickets form almost their entire diet when they gather into flocks among the foothills of the west after the breeding season. Dr. Fisher estimates that each hawk will eat at least 200 grasshoppers daily. They are also great enemies of the

ground squirrels and other injurious rodents. Evidence shows that they rarely touch poultry, game or small birds.

Swainson's Hawks are very similar to Red-tailed Hawks, but the adult has a dark patch or band of feathers across the breast which is conspicuous even to the naked eye when the distance from the observer is not over seventy or eighty yards. The tail is grayish, rather than fuscous or brown, and is barred with black. This latter can be seen with a binocular. In addition, only three primaries are notched while in the red-tail there are four.

11. *Buteo platypterus platypterus* (Vieillot). Broad-winged Hawk.

The Broad-winged Hawk is the smallest of the Buteos. This alone as a field character has considerable weight. It is fuscous above in all plumages, adults white beneath, heavily barred with brownish. The tail in the adults is a very important mark of identification. It is black with two white crossbars and a whitish tip. These characteristics can be readily seen, especially with a glass. Immature birds are streaked ventrally, the tail grayish or brown, with five to seven indistinct black bars and a narrow whitish tip.

Insects, small mammals, reptiles, batrachians, and occasionally small birds, make up the diet of the broad-wing. Dr. Fisher considers its greatest damage to be the destruction of beneficial toads and snakes.

Genus ARCHIBUTEO Brehm.

- I. Plumage almost entirely black; primaries and tail barred with whitish and grayish. . . . *A. lagopus sancti-johannis*. ROUGH-LEGGED HAWK, black phase.
- II. Plumage above, fuscous.
 1. Underparts light with dark fuscous or black band across belly.
 - a. Dark band of belly broken or indistinct. . . . *A. lagopus sancti-johannis*. Normal adult. ROUGH-LEGGED HAWK.
 - b. Dark band quite distinct and continuous across belly. . . . *A. lagopus sancti-johannis*. Normal immature ROUGH-LEGGED HAWK.
 2. Underparts also fuscous, occasionally varied above and below with rufous; no trace of darker band across belly. . . . *A. ferrugineus*. Ferruginous Rough-leg, dark phase.
- III. Plumage above rufous; underparts mostly white, barred with rufous on sides and belly. . . . *A. ferrugineus*. Normal FERRUGINOUS ROUGH-LEG.

Both North American species of Rough-legged Hawks occur in Kansas. *A. lagopus sancti-johannis* is a winter resident only, but is fairly abundant during the time of its presence here. *A. ferrugineus* is a common resident of western Kansas, occurring occasionally eastward.

The rough-legs are the only true hawks placed in the class of birds of prey entirely beneficial by Dr. Fisher. They are of medium

size and have long wings which are broad but pointed at the tips. The first four primaries are slightly notched or emarginate but although these feathers separate in flight to a certain extent, the pointed wing effect is not lost. With the exception of the dark tips and a dark patch formed by the under primary coverts distal to the carpal bend of the wing (a conspicuous banner mark when the bird is in flight), the under surfaces of the primaries and secondaries are light and unmarked. The tail is moderately long and square. It is less often spread in flight than that of the red-tail.

These hawks are somewhat crepuscular in habits and are often seen soaring in the manner of the Buteos. They resemble them also in their fondness for remaining motionless for hours on a favorite look-out perch, dropping down occasionally to pick up a meadow mouse or some other small mammal. Their food consists entirely of mammals; meadow mice or voles are especially preferred. Dr. Fisher, after making careful inquiries of experienced field workers in districts where the rough-legs are common, could find no evidence of their ever attacking birds. The examination of stomachs of specimens shot in locations teeming with waterfowl showed them to contain nothing but the remains of meadow mice. In view of this evidence, the statement of some of the older writers to the effect that waterfowl are the favorite prey of rough-legs seems to be erroneous.

12. *Archibuteo lagopus sancti-johannis* (Gmelin). Rough-legged Hawk.

The American Rough-leg is not particularly difficult to identify in the field for its characteristic size, form, and flight behavior at once place it in regard to genus. In the normal phase both adult and immature of the common species are dark brown above though the underparts differ. In the case of the immature, the belly is crossed by a quite distinct dark band which is usually of very dark brown. The band of the adult is broken and much less distinct but clearly discernable with good light and a binocular. The breast is light buff in both cases. A distinct difference in color between breast and belly denotes the common rough-leg in the normal phase. The melanistic phase is almost entirely black, though the tail and primaries are barred with whitish and grayish.

13. *Archibuteo ferrugineus* (Lichtenstein). Ferruginous Rough-leg.

The Ferruginous Rough-leg is sometimes called the "Squirrel Hawk" because of its fondness for spermophiles or ground squirrels which are common pests of the prairie region throughout which it is

found. Its normal coloration is mostly rufous above and white below. The sides and belly are barred with rufous but there are no crossbars on the primaries and secondaries. This will at once distinguish it from the Osprey which is found normally only near water, is much darker above, and has longer wings. The melanistic phase of *A. ferrugineus* is a brown or fuscous coloration, occasionally varied with rufous, both above and below. The solid color beneath, with no trace of the lighter breast and darker belly, makes it distinct from the normal *A. lagopus sancti-johannis*.

Genus AQUILA Brisson.⁷

14. *Aquila chrysaetos* (Linn.). Golden Eagle.

The Golden Eagle is the largest bird of prey included in this paper. It sometimes reaches a length of 40 inches and an expanse of wing approaching eight feet. It is listed by Goss (1891), Snow (1903), and Dyche (1904), as a rare Kansas resident. It now seems, however, that it is only a casual winter visitor, as no nesting records have recently been reported from this region.

The economic status of this eagle depends greatly upon the locality in which it is found and upon the individual. The records which Dyche based upon the examination of thirty stomachs covering a period of twenty-two years are of sufficient interest and significance to be here included:

Twenty-three of the thirty birds were taken in Kansas. None were taken in April, June, July, August, or September and but one in May.

Eleven had eaten cottontail rabbits.

Seven had eaten jackrabbits.

Nine had eaten prairie-dogs. Five of these had eaten more or less of two different animals, as was shown by the food mass containing more than two fore or hind feet, two tails, or two pairs of ears.

One, Riley County, May, 1883, had in its crop a mass of partly digested stuff that contained feet and some bones and hair, that seemed to belong to a young coyote wolf.

One, October, 1889, from the state of Washington, had been feeding upon a woodehuck.

One, Douglas County, October 7, 1891, had eaten a Franklin's ground squirrel and a cottontail rabbit.

One, March 11, 1894, contained remains of a short-eared owl, *Asio flammeus*, and a cottontail.

One, Wabunsee County, November, 1885, had eaten opossum.

One, Franklin County, January 25, 1902, had fed upon a fox squirrel.

One, November 17, 1904, contained a cottontail rabbit and foot and leg of a Red-tailed Hawk.

Twenty-three of the birds had fed on rabbits or prairie-dogs, the animals most common in the localities where the birds were taken. One hawk and one owl constitute the only traces of bird food. However, but one eagle was taken in the spring and summer months (May) when birds would perhaps be most likely to be taken as food.

⁷See key to genera for differences due to age, etc.

During the winter of 1922-23, the writer examined the stomachs of a male and a female from Franklin County, each of which contained a large quantity of the flesh of the cottontail rabbit. A third, a female from Douglas County, had both crop and stomach filled to capacity with the flesh, bones and feathers of a nearly full grown Plymouth Rock chicken.

From the above data, it appears that the Golden Eagle prefers a mammalian diet though it must be kept in mind that all these birds were killed during the fall, winter, or very early spring when they would be less likely to capture birds for food.

Even were they more destructive to the farmers' interests, the Golden Eagles are not common enough to be considered a serious menace to either poultry or game birds. They should be killed only in individual cases when caught in the act of committing a serious depredation.

The key to genera distinguishes the adult *Aquila* from the immature forms of both the *Aquila* and *Haliaeetus*. The adult Golden Eagle is recognizable even at a considerable distance with a binocular by the absence of the white at the base of the tail, the dark feathered tarsi, and the golden brown or buffy of the head and nape. Their immense size, strength of movement, and heavy, broad wings distinguish them in flight. The base of the tail of immature individuals is white and the tarsal feathers light.

Genus HALIAEETUS Savigny.⁸

15. *Haliaeetus leucocephalus leucocephalus* (Linn.). Bald Eagle.

The Bald Eagle in this region seems to be less common than the foregoing species. It is also listed by the older Kansas writers as a rare resident and a fairly common winter visitor. Its favorite food is fish which it secures preferably by robbing the Osprey, though it is perfectly capable of fishing for itself when necessary. Its habits are somewhat similar to those of the buzzard hawks or Buteos in that it occasionally eats carrion when better food is not easily available. In the west it is perhaps to be considered beneficial as it preys upon rabbits, prairie dogs, and other destructive rodents. It is also fond of waterfowl, poultry, young pigs, and lambs, and is capable of doing considerable damage by its activities in the near proximity of a farmstead. Like the Golden Eagle, nevertheless, it should be treated as an individual and given protection as long as it confines its hunting to legitimate prey.

⁸See key to genera.

The white head and tail of the adult of this species make it easily recognizable at almost any distance. The immature form closely resembles the Golden Eagle though its plumage may present a more mottled appearance. If one can approach near enough, a task by no means easy, he can, with the aid of a strong binocular, distinguish the young Bald Eagle by its naked tarsi. This part of the leg is fully feathered in all specimens of the genus *Aquila*.

Genus FALCO Linnaeus.⁹

- I. Back and tail rufous.
 1. Wing coverts slaty blue; underparts buffy with sides and belly spotted with black. . . . *F. s. sparverius*. Male SPARROW HAWK.
 2. Wing coverts rufous, barred with black; underparts buffy but streaked with dark ochraceous buff. . . . *F. s. sparverius*. Female SPARROW HAWK.
- II. Back and tail not rufous: underparts buffy streaked with fuscous or blackish.
 1. Upperparts slaty blue; tail with white tip and three or four distinct whitish bars. . . . *F. c. columbarius*. Adult PIGEON HAWK.
 2. Upperparts fuscous; tail with whitish tip and the three or four whitish bars indistinct. . . . *F. c. columbarius*. Immature PIGEON HAWK.

The falcons are to be easily recognized at any time and in any plumage by their long, narrow, pointed wings which are flat, rigid and unbroken at the end, admirably adapted to swift flight in the open. The middle feathers of the tail are the longest, causing the tail to appear rounded when spread and somewhat pointed when closed.

The long-winged hawks or falcons strike their prey in the air, killing it by a direct blow of the foot. They attain a position above their quarry, dash down headlong, and strike it a powerful blow, following it down and striking again if necessary. They do not cling to their prey.

Falcons are most at home in the open country where their extraordinary powers and skill in flight can be employed to the greatest advantage. Some of the larger species are here of little economic significance, though, if common in this region, would be destructive to wild life and poultry to a considerable degree. Of the two smaller species here discussed, *F. s. sparverius* is by far the more abundant.

16. *Falco columbarius columbarius* Linn. Pigeon Hawk.

The Pigeon Hawk is placed in the class of birds of prey partly beneficial and partly harmful. It is not at all common in this region,

⁹In the Eighteenth Supplement to the A. O. U. Check-List the subspecies of the Sparrow Hawk were placed in a new genus, *Cerchneis*. The key for the genus *Falco* is based upon the nomenclature of the 1910 Check-List, which included the Sparrow Hawks in this genus. The key will be just as useful, however, in the original form.

occurring only as a migrant, and cannot be considered of much economic significance. It can be distinguished from the Sparrow Hawk, which is about the same size, by its general bluish gray or fuscous color, whereas the Sparrow Hawk is mostly bright rufous. From the Sharp-shinned Hawk it can be distinguished by the form of the wings and tail and manner of flight. Adults are slaty blue above, streaked with fuscous or blackish on a buffy ground color below, and tail distinctly barred with white. Immature birds are fuscous above, similar to the adults below, and with the tail bars much less distinct.

Goss states that it seldom watches from a perch, or hovers in the air as it sights its prey, but as a rule darts rapidly through the thickets, and over the open ground, giving chase to the birds started in its course. It also feeds on squirrels, and other small rodents. Like all others of the falcon family, it strikes rapidly with its wings, never sailing except for a short distance. In flight it is said to greatly resemble the Mourning Dove and the wildpigeon, now extinct; hence the significance of its common name.

17. *Falco sparverius sparverius* Linnaeus. Sparrow Hawk.

This little falcon is the most abundant and most friendly of our diurnal raptors. It is common along roadsides, in open woods, and upland fields, perching upon a dead branch of a tree or a telegraph pole, awaiting the appearance of game beneath. From these lookout perches it is frequently an easy target as it will permit one to approach within easy gun range, sometimes only moving on down the line of poles for a short distance as the hunter draws near. In flight it is characteristically falcon-like, though it sometimes hovers with rapid wing beats above its intended victim, which is usually a grasshopper, before dropping lightly downward and grasping it in its talons. Often it is seen darting this way and that in pursuit of insects in the air. It usually returns to its perch to devour its larger victims.

Though occasionally it attacks young birds and very small poultry, its food is mainly insects and mice. Grasshoppers make up the largest part of the former. Where lizards are abundant they are frequently eaten.

Its nests are placed in hollow trees and sometimes are to be found in the very midst of the residence districts of cities or in parks where many people are continually passing. One nest in particular that came under the observation of the writer was on the campus of Ottawa University in a deserted woodpecker hole in an elm close to one of the buildings. A short time after the young left the nest it was

no uncommon thing, on passing the place, to see five or six of the owlsh youngsters sitting in a row on a weather vane.

The young closely resemble the adults in coloration. With a field glass, and under favorable conditions with the unaided eye, one can distinguish the slate gray shoulders and wings of the male from the black-barred rufous wings of the female. The belly and sides of the male are spotted with black while the female is streaked with dark ochraceous-buff.

Genus PANDION Savigny.

18. *Pandion haliaetus carolinensis* (Gmelin). Osprey. Fishhawk.

The Osprey, or Fishhawk, is not considered in Dr. Fisher's paper since its entire food consists of fish and its economic significance is perhaps negative in any locality. In this region its occurrence is only accidental. Its food habits make it obvious that it is most common along the sea coasts and the shores of the larger inland lakes and rivers. Goss states that it manifests no disposition to harm smaller birds of any sort, appearing quite friendly toward them. Small birds are often seen perched beside the Osprey and the Purple Grackles are said to build their nests in the interstices of the outer sticks that lay the foundation of the Osprey's nest, and there hatch and rear their young in safety.

Once seen in flight the Osprey is never to be forgotten. It is somewhat larger and more slender than the Rough-legged Hawk which it slightly resembles in form and shape of wing, but is more swift and graceful in flight. The Osprey is white beneath with a more or less distinct band of brownish spots across the chest and a prominent black line through the eye and extending to the nape. Above it is dark brown, the primaries and secondaries are black-tipped; beneath, it is white with dark crossbars on the larger wing feathers. The crossbars also distinguish it from the rough-leg. The plumage has a peculiar oily odor that persists for many years after death and may be recognized whenever the birds are handled, and is characteristic even of the eggs. Its flight behavior, however, is by far the best field distinction. Goss quotes a splendid description from Wilson of the flight characteristics of the Osprey which is, however, too long to include here.

Two specimens of this species were taken in Franklin County recently; one in 1921, which is now in the collection of the writer, and one in 1922, now in the collection of Ottawa University.

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